

INTERAK CP/M PLUS

USER MANUAL

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GETTING STARTED WITH CP/M 3.0 (Version 880120)

Now that you have received your copy of CP/M 3.0 the first thing you must do is make a copy of it.

1. FORMAT a diskette ready to receive data.
2. COPYSYS copy system tracks to the formatted diskette.
3. PIP (copy) files onto the formatted diskette.

FORMAT

Insert Master diskette into drive 'A' (make sure it is 'Read Only' ie the window is open).

Insert the blank diskette into drive 'B' (make sure it is 'Read/Write' ie the window is closed).

Type **FORMAT B:<RET>**

Note: It is important to include both the 'B' and the ':' in the command line above otherwise the logged diskette will be the one that is formatted!

The screen will present the default format data which can be accepted by typing **<RET>**
changed by typing **C**
or terminated by typing **X**

accept the defaults: **<RET>**

A warning message will appear and you are invited to commence formatting the diskette by typing **<CNTRL>F**

As a safety measure formatting will not take place until both the 'control' key and the 'F' key are pressed together.

When you have formatted enough disks type **X** to exit the program.

Where you see **<RET>** this is to indicate you press the 'Carriage Return' key also known as 'Return', 'Enter'.

Where you see **<CNTRL>** this is to indicate you press the 'Control' key.

COPYSYS

Still with the diskettes in as above.

Type **COPYSYS<RET>**

The screen will present the default format data which can be accepted by typing **<RET>**
changed by typing **C**
or terminated by typing **X**

accept the defaults: **<RET>**

A warning message will appear and you are invited to commence copying the systems tracks <RET>

When you have COPYSYSed enough disks type X to exit the program.

PIP

Still with the diskettes in as above.

Type PIP B:=A:*. *[OV]<RET>

this will copy all the files onto diskette 'B' from diskette 'A'.

Note the use of the square brackets [], the 'O' is for Object files and the 'V' is for Verifying that the copy is the same as the original.

Use this to make a 'BACK UP' of your Master Disk and remember to keep your master safe.

or

Type PIP B:=A:CPM3.SYS[OV]<RET> this will copy ONLY the file 'CPM3.SYS' on diskette 'A' onto diskette 'B'.

Use this to copy only the files you need.

We recommend you copy at least the following files onto your diskettes for your own use:-

CPM3.SYS
FORMAT.COM
PIP.COM
COPYSYS.COM

If you have only one drive you will need to use the SOLO.COM program to make the one physical drive appear to the system as two logical drives.

Type SOLO<RET>

Take care to ensure that you do not mix up the diskettes. When using SOLO and FORMAT remember to insert the diskette you want formatting before the <CNTRL>F.

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The aim of this manual is to provide users of Interak CP/M Plus with enough information to run existing software, and assumes no prior knowledge of CP/M. For users who wish to know more about CP/M and/or write their own software, Greenbank Electronics can supply appropriate manuals by Digital Research.

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1 SPECIFICATION FOR INTERAK CP/M PLUS (V3.0)

The flexibility built into Interak CP/M Plus means that it can be altered to run on any Interak system within the constraints of the following specification:-

1.1 MICROPROCESSOR

The system processor must be a Z80 or code-compatible device.

1.2 MEMORY

64K of RAM is required.

1.3 FLOPPY DISK CONTROLLER

The system must utilise the FDC-1 Floppy Disk Controller Board addressed as recommended by Greenbank Electronics in the FDC-1 data sheet.

1.4 CONSOLE

Either a serial or memory-mapped visual display unit, together with a serial or parallel keyboard may be used, configuration being achieved by setting 2 di switches on the FDC-1 board.

The serial vdu and/or serial keyboard is addressed with the status and data ports as 00H and 01H respectively.

The memory-mapped vdu must be 64 columns by at least 24 lines, with a start address of F000H (eg VDU-2K).

The parallel keyboard is addressed as 40H, with data bit 7 as the positive strobe bit.

1.5 PRINTER

The operating system will support a serial listing device, addressed with the status port as 02H and the data port as 03H.

1.6 DRIVE FORMATS

The System drive (A) must always have the following format:-

- Double-sided
- Double density
- 512 bytes per sector
- 20 sectors per track
- 80 tracks per disk
- 2 reserved tracks
- 256 directory entries
- 4k block size

This format is the Interak Standard and is lodged with the CP/M Users Group (UK).

The other drives (B, C, and D) are similarly supplied.

1.7 RECONFIGURATION

The port addresses of the serial console, the parallel keyboard, and the printer are held in a table and can be altered using a utility such as ZSID if necessary:-

| Hex Addr | Default Value | Use |
|-------------|------------------|----------|
| ---- | ----- | --- |
| F780 | 00H | CONSOLE |
| F781 | 02H | PRINTER |
| F782 | 40H | KEYBOARD |

Drive A must be configured as shown in 1.6 but drives B, C, and D can be individually reconfigured to almost any format using a utility called SETDISK, available separately.

2 CONSOLE CONFIGURATION

As stated in the specification, Interak CP/M Plus supports either a serial or memory-mapped vdu, and a serial or parallel keyboard. The choice is made by setting dip switches on the FDC-1 board as follows:-

| Switch | Function | Off (=1) | On (=0) |
|--------|----------|----------|---------------|
| ----- | ----- | ----- | ----- |
| S1h | vdu | serial | memory-mapped |
| S1g | keyboard | serial | parallel |

The BIOS reads the switches during every Cold Start, and self-configures to operate with the appropriate hardware. The selected options are displayed within the logon display.

2.1 SERIAL VDU

The screen data produced by both CP/M commands and Greenbank utilities is in ascii code, with only very basic control codes like carriage return being used. Cursor positioning codes have purposely been avoided to enable any make of vdu to work with the distribution software. Many proprietry programs, however, need to be installed for use with your specific vdu before they will operate satisfactorily.

The vdu format as supplied is 64 columns by 24 lines to suit VDU-2K but the format can be expanded to 80 columns for a serial console by running GENCPM. The area of memory normally used by the memory-mapped vdu can be reclaimed at the same time by setting the top page of memory to F6. (F700 to FFFF is used by the system.)

If flow control is needed, it should be provided by hardware means. Software flow control (eg x-on, x-off) causes problems with some proprietry programs.

2.2 MEMORY-MAPPED VDU

The start address of the memory-mapped vdu board is F000H, and is not alterable. The memory-mapped vdu routines within the Interak BIOS use the same control codes as the Lear Siegler ADM3A vdu. Hence, if you wish to install proprietry software, specify the ADM3A. The actual control codes used are:-

| Code | Function | Remarks |
|---------|--------------------|-----------|
| ---- | ----- | ----- |
| 07H | Null | no bell |
| 08H | Cursor left | |
| 09H | Tab | |
| 0AH | Line feed | |
| 0BH | Cursor up | |
| 0CH | Cursor right | |
| 0DH | Carriage return | |
| 1AH | Clear screen | |
| 1BH,33H | Inverse video on | |
| 1BH,34H | Inverse video off | |
| 1BH,3DH | Cursor positioning | see below |
| 1EH | Cursor home | |

The four byte cursor positioning sequence is:-

1BH,3DH,ROW+20H,COLUMN+20H

The row and column numbers begin at 0.

3 FIRST STEPS

3.1 OVERVIEW

CP/M denotes Control Program for Microcomputers. CP/M Version 3.0 (known as CP/M Plus) is the latest in a series of enhancements to the original 8 bit CP/M operating system.

CP/M is a single-console operating system, supporting up to sixteen users, and providing an environment for program construction, storage, editing, and execution.

The operating system itself is made up of three distinct modules; the Basic Disk Operating System (BDOS), the Basic Input Output System (BIOS), and the Console Command Processor (CCP). The function of each module is discussed further in Section 6.

CP/M executes most commands by loading the appropriate file from disk into an area of memory called the Transient Program Area. These files are known as Transient Commands. A few commands are built into the operating system and are consequently known as Built-in Commands.

Reference is made throughout this manual to System Disks, System Tracks and System Files. Any disk designed to run in drive A has two reserved tracks (in the case of Interak) which contain the necessary cold start files, the system configuration, and the Console Command Processor. Such a disk is referred to as a System Disk, its first two tracks are referred to as the System Tracks, and the files thereon are known as System Files.

3.2 FILE REFERENCES

CP/M provides rapid access to data through a comprehensive file management sub-system. A file reference consists of a filename and an optional filetype, separated by a full-stop, eg:

DIR.COM LETTER.1 SHOPPING.LST

A filename may be up to eight characters long, and a filetype up to three characters long but neither must contain any of the following special characters:

<>[]()/\|. , ; : = ? * - %

All alphanumerics and the remaining special characters are allowed.

Filetypes are somewhat arbitrary, but in many cases software is dependant on certain filetypes for correct operation. For example, command files must have a filetype COM.

Ambiguous file references may be used to access batches of files with partly common filenames or filetypes. Wildcards are used for this purpose, the "?" replaces single characters and the "*" replaces multiple characters. The HELP Utility gives detailed information on this subject (see 3.4).

3.3 COLD START

When you switch on your Interak or operate the reset switch, only the system monitor is active. To load CP/M Plus, a System Disk must be present in drive A and the Boot (B) command must be entered from the keyboard.

The sign-on display gives the following information about the current configuration of the system:

- the start address and size of the BIOS.
- the start address and size of the BDOS.
- the amount of free memory space available for transient program use.
- the BIOS version number.
- the selected type of vdu and keyboard.

If all is well, the Console Command Processor is loaded and the system prompt 'A>' is displayed. 'A' signifies the current default drive. This is your invitation to enter a command.

3.4 HELP

One of the best features of CP/M Plus compared to its predecessors is the Help Utility. Detailed guidance on invoking the Digital Research commands on the distribution disk is available by typing:

HELP <RETURN>

at the system prompt. This is the ideal first command, and liberal use should be made of it until familiarity with the available commands is gained.

3.5 HARDCOPY

If you have a printer connected to your Interak, and you want a hardcopy of what transpires on the vdu, enter <CTRL-P> at any time during the input of a command. The same action will disable the hardcopy output if repeated.

4 INVENTORY

This section is an introduction to each file on the distribution disk. No attempt has been made to duplicate the detailed information available within the Help Utility, so reference should be made to the latter before commands are invoked.

Files annotated with (Digital Research) are written by Digital Research, designed for use on any machine which supports CP/M Plus. Those annotated with (Interak) are written specifically for the Interak 1 computer.

Files annotated with (Redundant) are, as far as this implementation is concerned, redundant utility files provided by Digital Research to aid the creation of the system software. They were not used in the creation of Interak CP/M Plus but are provided in case anyone wishes to refer to them or produce their own system software.

References to "banked" and "non-banked" relate to the memory arrangement of a system. Interak 1 is a non-banked system.

BDOS3.SPR (Digital Research)

A relocatable system file containing the BDOS for a non-banked system. It is combined with BIOS3.SPR by GENCPM.COM to produce CPM3.SYS.

BIOSKRNL.ASM (Redundant)

Provided as a model for the creation of the BIOS.

BIOS3.SPR (Interak)

The Interak CP/M Plus BIOS in relocatable form. BIOS3.SPR is combined with BDOS3.SPR by GENCPM.COM to create the complete CP/M Plus System file CPM3.SYS.

BNKBDOS3.SPR (Redundant)

A relocatable system file containing the BDOS for a banked system. It is combined with RESBDOS3.SPR and BNKBIOS3.SPR by GENCPM.COM to produce CPM3.SYS.

BOOT.ASM (Redundant)

Provided as a model for the creation of the Cold Boot Loader.

CALLVERS.ASM (Digital Research)

An example assembly file aimed at programmers.

CCP.COM (Digital Research)

The Console Command Processor loaded by the operating system at every Warm Start. It resides on the System Tracks of any disk which needs to run in drive A, and is copied from disk to disk by COPYSYS.COM.

CCP.COM must be present on the System Tracks of the disk in drive A during warm starts. If not, the message, "Insert System Disk in drive A", is given.

CHARIO.ASM (Redundant)

Provided as a model for the creation of a part of the BIOS which handles character input and output.

COPYSYS.ASM (Redundant)

Intended as the basis for COPYSYS.COM (see below). It has not been used in the Interak 1 implementation, a purpose built COPYSYS has been created for Interak.

COPYSYS.COM (Interak)

Copies the System Files and optionally CPM3.SYS between drives. See Section 5 for more information.

CPM3.LIB (Redundant)

A library of routines which aid the generation of various software tables during the creation of the BIOS.

CPM3.SYS (Digital Research & Interak)

This is the file which contains the operating system itself, residing in the data area of all System Disks. It is produced by GENCPM.COM which brings together the BDOS and BIOS.

CPMLDR.REL (Digital Research)

Used in the creation of the CP/M loader, which resides on the System Tracks.

DATE.COM (Digital Research)

Sets or displays the date used for date-stamping the directory entries (optional).

DEVICE.COM (Digital Research)

Utility for displaying and altering the physical to logical device assignment and the attributes of peripheral devices. Not yet implemented in the Interak BIOS.

DIR.COM (Digital Research)

Displays the names and conditionally the attributes of files on any specified drive. Part of this command is built into the operating system.

DIRLBL.RSX (Digital Research)

Resident System Extension used with DIR.COM.

DRVTLB.ASM (Redundant)

Example drive parameter tables for BIOS construction.

DUMP.ASM (Digital Research)

Assembly file of DUMP.COM intended as an example of file handling source code.

DUMP.COM (Digital Research)

File dump utility which displays the hexadecimal data content of a file in tabular form.

ECHOVERS.ASM (Digital Research)

An example assembly file aimed at programmers.

ED.COM (Digital Research)

Digital Research's simple (?) text editor.

ERASE.COM (Digital Research)

Deletes files. Use with care, Digital Research does not provide UNERASE.COM!

FD1797SD.ASM (Redundant)

Example Floppy Disk Controller routines for BIOS creation.

FORMAT.COM (Interak)

Initialises floppy disks. See Section 5 for more information.

GENCOM.COM (Digital Research)

Creates special COM files with attached system extensions. Aimed at programmers.

GENCPM.COM (Digital Research)

Combines the BDOS and BIOS after a question and answer session to create the CP/M system file CPM3.SYS. The screen size and memory availability can be changed with this utility. The memory ceiling is set at EFFF on the Distribution Disk to suit VDU-2K. If a serial console is being used F000 - F6FF can be reclaimed by setting the top page of memory to F6. (F700 - FFFF is used by the system.)

GET.COM (Digital Research)

Directs the system to take console input from a disk file instead of the keyboard.

HELP.COM (Digital Research)

Detailed operational instructions for the Digital Research command files on the distribution disk.

HELP.HLP (Digital Research)

Text file for HELP.COM.

HEXCOM.COM (Digital Research)

Generates a COM file from a HEX file. Used to be called LOAD.COM in earlier versions of CP/M.

HIST.UTL (Digital Research)

Generates histogram of execution frequency of program segments when utilised under SID.COM.

INITDIR.COM (Digital Research)

Initialises the directory area to enable date stamping of files. Date stamping is optional.

LIB.COM (Digital Research)

Supplied for programmers, manages libraries of object modules for inclusion during program assembly.

LINK.COM (Digital Research)

Links relocatable object files to create command files for execution.

MAC.COM (Digital Research)

Macro Assembler. Assembles 8080 source code files into relocatable object files.

MODEBAUD.LIB (Redundant)

Example table for software controlled input/output.

MOVE.ASM (Redundant)

Example BIOS routines mainly for banked memory.

PATCH.COM (Digital Research)

Used for installing official software patches into the system or command files.

PIP.COM (Digital Research)

Peripheral Interchange Program. Used for copying data to or from files or devices.

PORTS.LIB (Redundant)

Example port table for BIOS creation.

PUT.COM (Digital Research)

Diverts console or printer output to a file.

RANDOM.ASM (Digital Research)

Example assembly file demonstrating random access to file records.

RENAME.COM (Digital Research)

Changes the name of a file or files. Part of this command is built into the operating system.

RESBDOS.SPR (Redundant)

Part of BDOS for banked systems.

RESBDOS3.SPR (Redundant)

Part of BDOS for banked systems.

RMAC.COM (Digital Research)

Relocatable macro assembler.

SAVE.COM (Digital Research)

Copies a specified portion of memory to a disk file.

SCB.ASM (Redundant)

Assembly file of the System Control Block used by the operating system but also available for use by the BIOS.

SET.COM (Digital Research)

Sets certain attributes of files.

SETDEF.COM (Digital Research)

Defines disk order for program search, and console display modes.

SHOW.COM (Digital Research)

Displays drive characteristics, including disk free space.

SID.COM (Digital Research)

Program debugger mainly for 8080 code, but can be used with a Z80 to a limited extent.

SOLO.COM (Interak)

Utility for copying files between disks when only one drive is available.

SOLO.RSX (Interak)

Resident System Extension used with SOLO.COM.

SUBMIT.COM (Digital Research)

Allows the execution of a batch of commands previously entered into a SUB file. If a text file called PROFILE.SUB is created, the contents will be executed automatically at Cold Start without console intervention.

TRACE.UTL (Digital Research)

Utility used with SID.COM or ZSID.COM for controlled program execution and trace.

TYPE.COM (Digital Research)

Displays the contents of an ASCII file.

USER.COM (Digital Research)

A completely built-in command therefore not in the directory. Changes the current user number (0 to 15). The user number is displayed in the prompt before the letter of the currently logged drive, eg 15A>. If the user number is 0, it is suppressed.

XREF.COM (Digital Research)

Provides a cross-reference of variables between relocatable modules after linking.

Z80.LIB (Digital Research)

Extends the RMAC assembler to use the additional Z80 mnemonics.

ZSID.COM (Digital Research)

This is a Z80 version of SID.COM, ie it uses the Z80 mnemonics and supports the Z80 op-codes; SID is only suitable for 8080 use. ZSID is not part of the standard CP/M Plus package but its provision here is the outcome of negotiations between Greenbank Electronics and Digital Research, who have generously allowed ZSID to be added to satisfy the special needs

of Interak users. Note that SID on this disk has been modified from earlier SID versions which were produced for CP/M 2.2, to make it compatible with CP/M Plus. For example (according to CP/M experts David Powys-Lybbe & Andrew RM Clarke) it contains a 'W'rite facility and can understand PRL bit maps. ZSID has not been so modified, but nevertheless is perfectly usable under CP/M Plus. There is no manual for ZSID; instead you must use the SID manual, taking it with a pinch of salt where necessary.

5 COMMAND INSTRUCTIONS FOR INTERAK UTILITIES

This section contains detailed instructions for the execution of programs written specifically for Interak.

5.1 COPYSYS.COM

Any disk required to run in drive A, the System Drive, should have System Files on its first two tracks and CPM3.SYS in its data area.

COPYSYS is used to copy the System Files and optionally CPM3.SYS from disk to disk.

Note that the drive you wish to copy from AND the drive you wish to copy to, must be configured in the standard format. If you only have one drive configured in the standard format, you will need to copy from Drive A to Drive A. You will be prompted for disk changes as necessary.

Simply type:

COPYSYS <RETURN>

to invoke the command, and follow the prompts. Multiple copies can be made before returning to the system prompt, and the parameters are presented for acceptance or alteration before each operation.

5.2 FORMAT.COM

This utility initialises floppy disks in the current format of the specified drive. Verification of successful formatting takes place after each track is initialised.

FORMAT signs on, offering to initialise the disk specified in the command line (eg. FORMAT B:), or drive A if no other drive is specified, from its first to its last track with an interleave of two. These parameters can be changed and all entries are checked for validity before formatting proceeds.

The track number is displayed as each track is initialised and verified, with the program terminating with a fault report if verification fails. By setting the first and last tracks accordingly, faulty tracks can be retried without having to re-initialise the whole disk.

Note that an interleave of 0 is not accepted. The interleave of a disk which has consecutive sector numbering is 1.

5.3 SOLO.COM

If your system has only one drive fitted, this utility may be used to allow reading and writing to a second disk. It diverts input and output for drive B to physical drive A, prompting for disk changes where necessary.

Commands such as directory listing and file copying can be used, but the onus is on the user to ensure disks do not get mixed up. Once invoked, the solo drive operation remains active until the next Cold Start.

The Solo utility is provided so that backup copies of files can be made even though only one drive is available. It is meant as a temporary solution, until funds permit the purchase of a second drive, and can never be as efficient as using two drives.